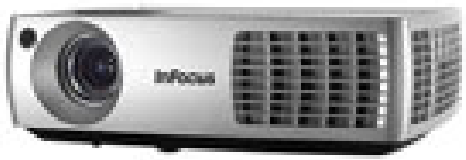
FHCS_CheckPi User Manual
Version 1.03

By Frits Handgraaf, 19-July-2012



Introduction.
This document is describing the FHCS_CheckPi software version 1.03 release. This manual may not apply to earlier or later releases of the software.
The User manual is providing an overview of what is required in terms of system requirements. It will further describe how to install the software, describe supported functions, the graphical user interface and the program features.
FHCS_CheckPi is licensed software against a license key fee. Contact Frits Handgraaf CS (FHCS) for price-information. (www.fritshandgraafcs.com)

Product and program features.
In Check Pi, 'Pi' stands for 'Projector interface'. As such, CheckPi is a tool to check your interface to a projector (or other intelligent product such as a controllable large display).
The program is not developed to support a specific projector Brand or Model.
It will support and allow you to test ANY projector/display with either a serial RS232 interface, a LAN (Ethernet RJ45) or WLAN (WiFi) interface, as long as you (as user) know the communication parameters and command string syntax for commands to send and receive replies.
Features of FHCS_CheckPi includes:

- Testing of PC data signals, either via VGA, DVI, HDMI or DisplayPort cable connections.
- Testing of Video signals, either via Composite, S-Video, Component, RGB or other cable connections.
- Testing of audio signals via audio connections.
- Testing projector control protocols, either via RS232, LAN or WLAN connections.
- Testing projector control string commands, and receiving projector feedback.
- Define your own GUI button captions (label descriptions) in your own language.
- Add your own GUI button icons, by importing graphic files in BMP or JPEG format.
- Save your Setup to registry for auto-load at startup (under your own manufacturer/protocol specification), or Print out your setup to printer or file. This way you can (with the same laptop), finalize multiple projector installations easily.

Frits Handgraaf CS (FHCS), specifically developed this program to assist professional Audio/Visual (A/V) installers.
Once an order has been received, typically, hardware installers prepare the boardroom, classroom or presentation facility. They install the projector (ceiling mount or rear-projection), install all the cabling, place the projection screen and may be other hardware.
If they have a PC or laptop, video device or signal generator (such as from Quantum Data), they can verify whether 'an image is shown' on the projector. This is merely cabling testing.
Software installers, after the hardware is in place, come with programmable A/V controllers and touch panel(s), to finalize the Graphical User Interface to the end-user customer's liking.
Before they program the A/V controller or other A/V device (switchers, scalers etc), they need to verify whether the projector (or other device):

- can re-present. They too need to know whether a PC image or video is presented correctly on the projector.
- can be reached. They need to know whether RS232 cabling or LAN cabling is correct, so that control commands are passed thru.
- can be controlled. After communication parameters are set, they need to know whether control commands are actually executed correctly.

Given the fact that most software installers are programming A/V controllers and programming the GUI (touch panel), via a laptop or PC (windows) based program, this is exactly where FHCS_CheckPi fits in.
After all, as a software installer, you do not want to first program a touch panel, program an A/V controller, to later find out that the communications settings are wrong or commands sent out are not understood…
FHCS_CheckPi allows to test before you finalize your programming.

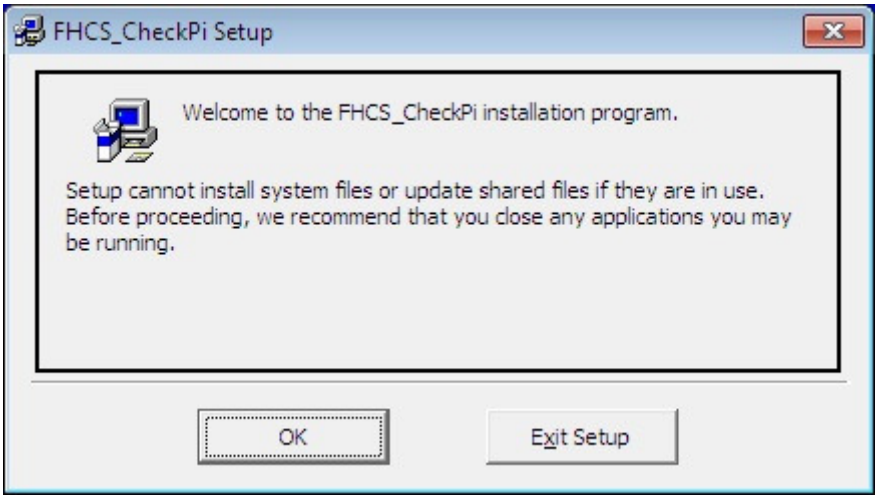
The software will run on any normal (standard) PC or laptop, with XP, Vista or Windows7 (Win7) operating system.

Projector checking specifics and settings savings::

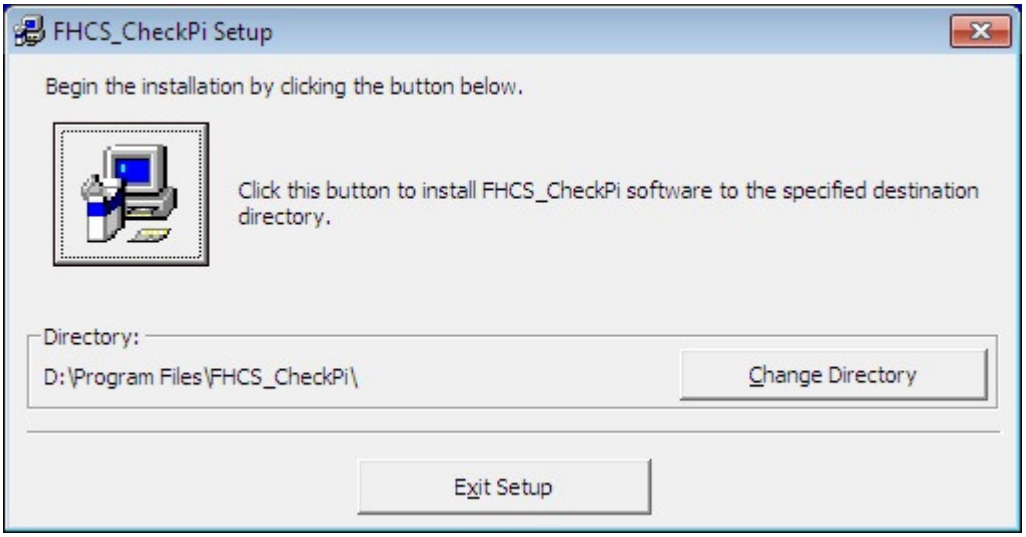
- You can select whether to make a connection via RS232 or TCP/IP.
- Under RS232, you can specify (PC) comm. port, baudrate, parity, databits, stopbits and handshaking protocol.
- Under TCP/IP you can specify (Projector) IP address, TCP port and local (PC) port to pass thru a (PC) Firewall.
- Projector can be connected over LAN (Ethernet, TCP/IP, RJ45) or WLAN if it has the capabilities. The program however is not supporting WEB based TCP/IP access.
- Projector can be connected over LAN with a network adapter (LAN/RS232) if projector only has RS232 connection possibility.
- You can pre-program the buttons to send out Projector commands, including Power On, Power Off, PC source input, Video source input, Audio mute and Audio un-mute.
- A direct command window is available to send/receive commands and responses. This window also allows you to monitor communication traffic.
- From a simple file (projectorsdef.txt) you can read in (pre-)defined communication settings and projector commands. The package is delivered with examples, but, with a simple text editor (such as Notepad), you can add entries or change them yourself.
- Save any communication settings or projector commands to registry under your own manufacturer/protocol name. This is handy when you have to test multiple manufacturer/protocol or models, of the same brand and type.

Software installation.

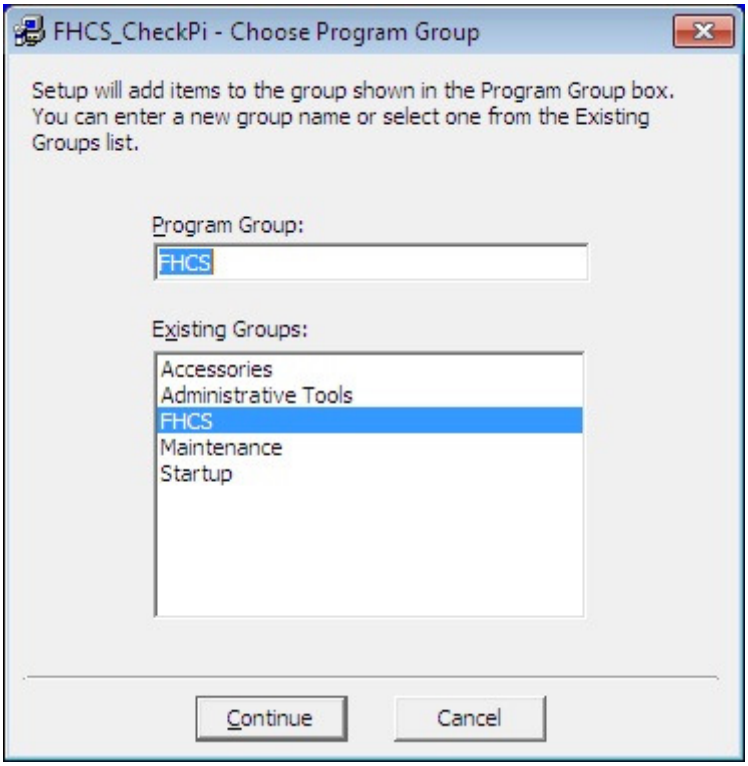
Once you have received the software (normally in the form of a ZIP file), Un-zip the file into an empty folder. Then run setup.exe to start the installation.
The following form will pop-up:


FHCS_CheckPi Setup
Welcome to the FHCS_CheckPi installation program.
Setup cannot install system files or update shared files if they are in use. Before proceeding, we recommend that you close any applications you may be running.
OK
Exit Setup

Hit OK to proceed.
Next form will show up:

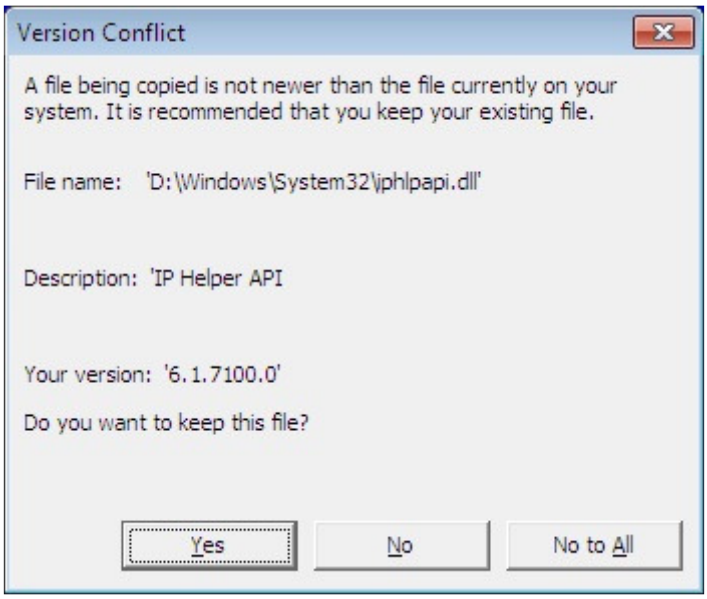

FHCS_CheckPi Setup
Begin the installation by clicking the button below.
Click this button to install FHCS_CheckPi software to the specified destination directory.
Directory:
D:\Program Files\FHCS_CheckPi\
Change Directory
Exit Setup

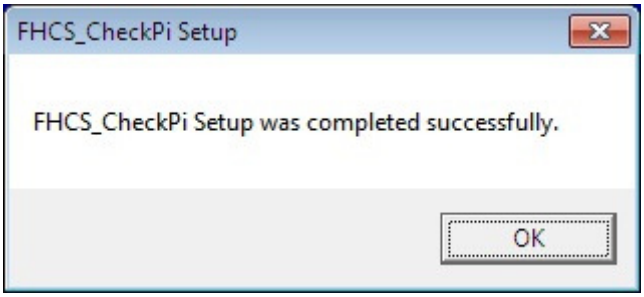
Left-mouse_Click the button to the left of ‘Click this button to install…’
Next form will be presented:



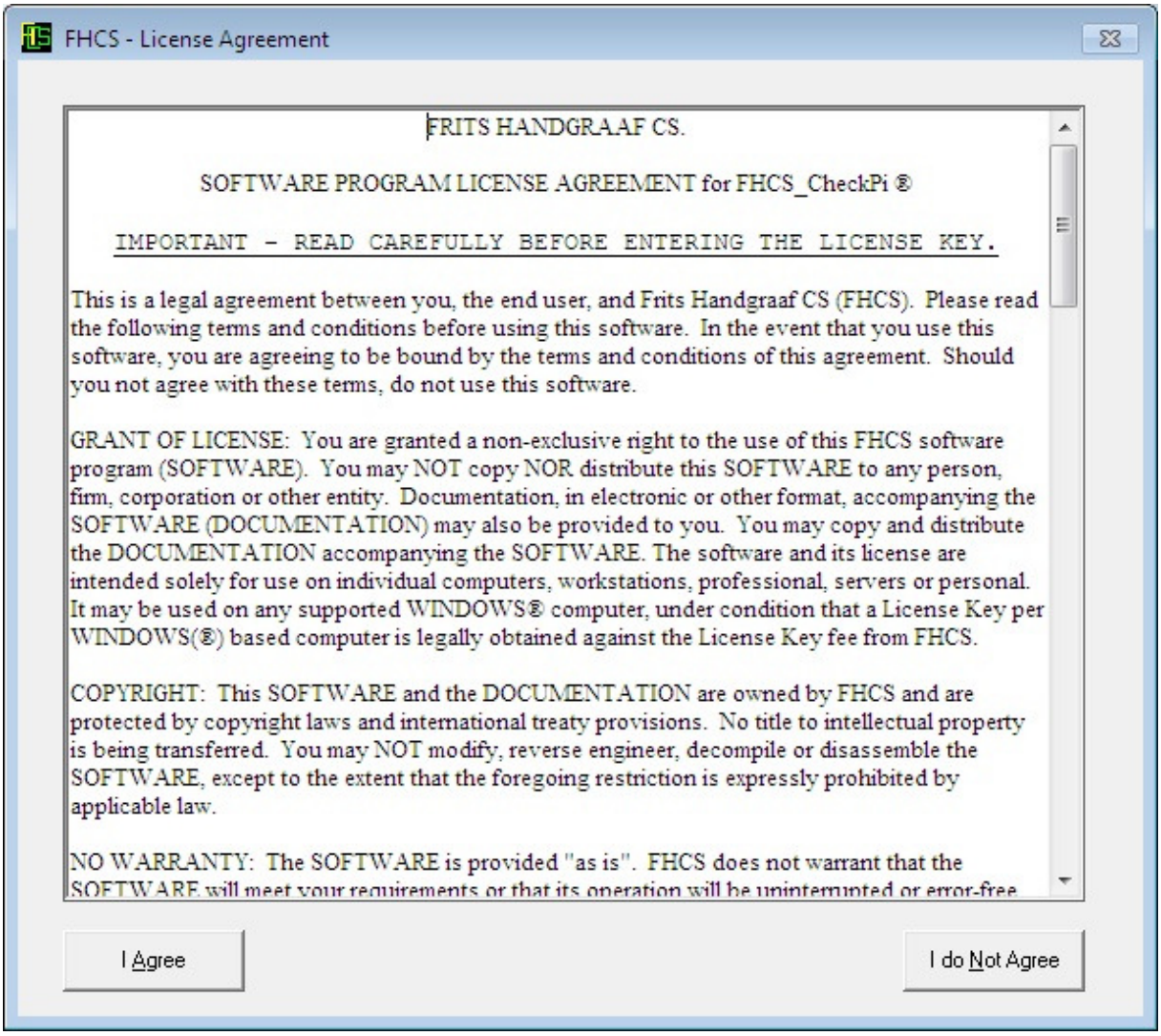
Select the Program Group under which you want to install the software. Hit Continue:

It might be that an existing file is newer than the one FHCS wants to install. Hit Yes.:


Version Conflict
A file being copied is not newer than the file currently on your system. It is recommended that you keep your existing file.
File name: 'D:\Windows\System32\iphlpapi.dll'
Description: 'IP Helper API
Your version: '6.1.7100.0'
Do you want to keep this file?
Yes
No
No to All



Once all required files are copied and the installation is complete, hit the OK button. The License Agreement form will show:


FHCS - License Agreement
FRITS HANDGRAAF CS.
SOFTWARE PROGRAM LICENSE AGREEMENT for FHCS_CheckPi ®
IMPORTANT - READ CAREFULLY BEFORE ENTERING THE LICENSE KEY.
This is a legal agreement between you, the end user, and Frits Handgraaf CS (FHCS). Please read the following terms and conditions before using this software. In the event that you use this software, you are agreeing to be bound by the terms and conditions of this agreement. Should you not agree with these terms, do not use this software.
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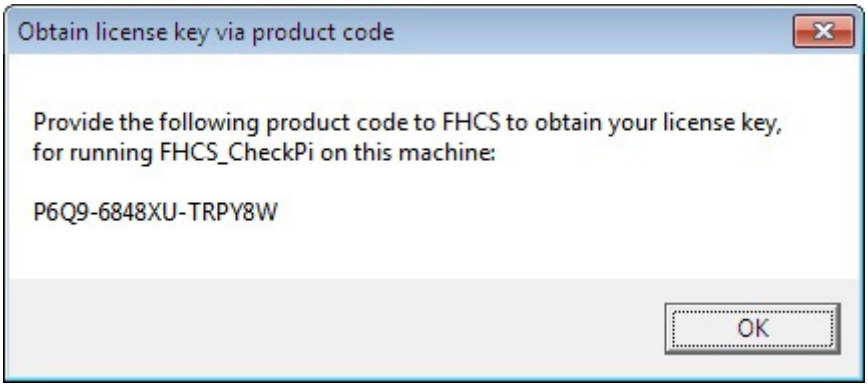
NO WARRANTY: The SOFTWARE is provided "as is". FHCS does not warrant that the
I Agree
I do Not Agree

Hit the I Agree button or enter Alt + A from the keyboard.
A form will show up showing the calculated product-code:


Obtain license key via product code
Provide the following product code to FHCS to obtain your license key, for running FHCS_CheckPi on this machine:
P6Q9-6848XU-TRPY8W
OK

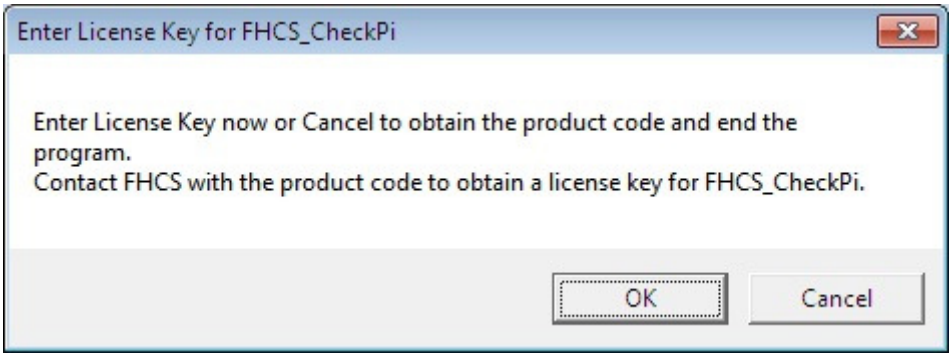
Like stated before, FHCS_CheckPi is licensed software.
A product code, format ‘ABCD-EFGHIJ-KLMNOP’ will appear in a message box.

This product-code is required to obtain your license key.

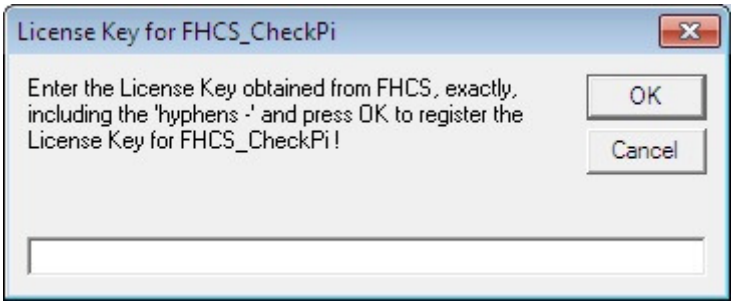
Please, with this product-code, contact FHCS.

Note: The product code is depending on a number of characteristics embedded in the PC on which you want to run this software. You can not duplicate this software and run it on any other PC. So be careful to choose the PC where you want to run the software on.

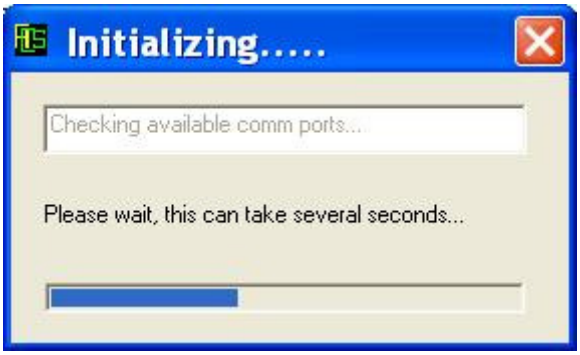
Once the license-key is obtained and starting the program up again, the software will request to enter the license key.
If not obtained yet, hit the Cancel button:


Enter License Key for FHCS_CheckPi
Enter License Key now or Cancel to obtain the product code and end the program.
Contact FHCS with the product code to obtain a license key for FHCS_CheckPi.
OK
Cancel

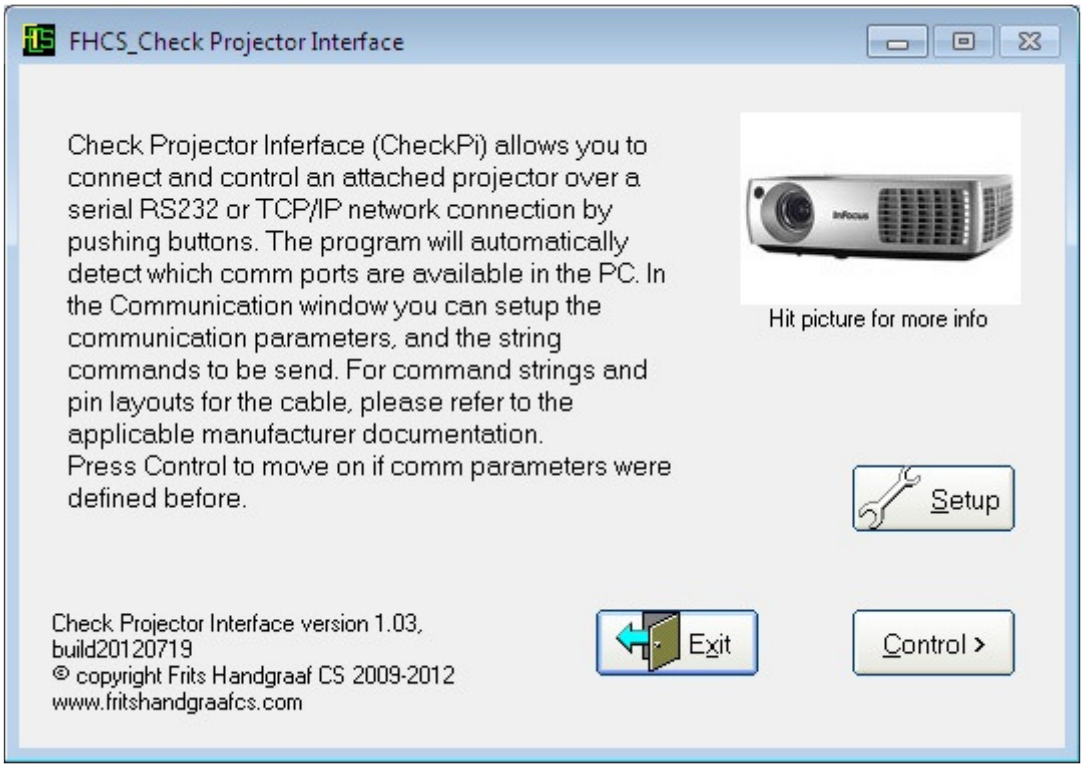
If obtained, enter the license key:


License Key for FHCS_CheckPi
Enter the License Key obtained from FHCS, exactly, including the 'hyphens -' and press OK to register the License Key for FHCS_CheckPi !
OK
Cancel

Startup/Main.
When starting up, FHCS_CheckPi will try to interrogate which RS232 ports are available in your PC.
An Initialize form appears:

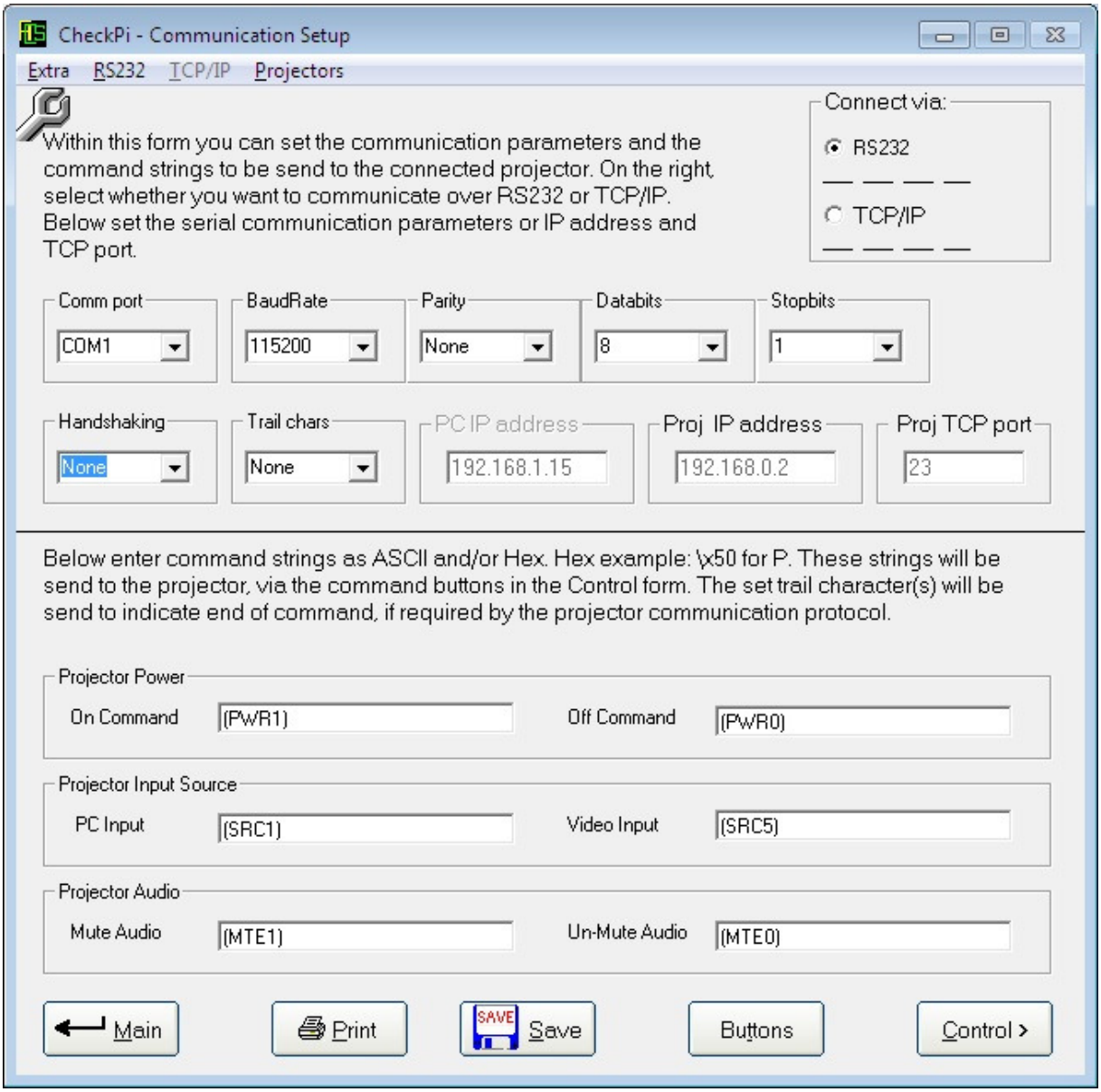


After startup, the Main Window will appear:


FHCS_Check Projector Interface
Check Projector Interface (CheckPi) allows you to connect and control an attached projector over a serial RS232 or TCP/IP network connection by pushing buttons. The program will automatically detect which comm ports are available in the PC. In the Communication window you can setup the communication parameters, and the string commands to be send. For command strings and pin layouts for the cable, please refer to the applicable manufacturer documentation.
Press Control to move on if comm parameters were defined before.
Hit picture for more info
Setup
Check Projector Interface version 1.03, build20120719
© copyright Frits Handgraaf CS 2009-2012
www.fritshandgraafcs.com
Exit
Control >

If an earlier connection was successfully made, the Control button would be enabled.
If not, hit the Setup button (or Alt + S) to go to the setup form.

Setup, communication parameters.



The Setup window is 'the heart of the application'. In here, you determine how to communicate (RS232 or TCP/IP, comm. ports, IP address etcetera), how to name/describe buttons in the control window, which icons to use in input the buttons, which commands to send to an attached projector or large display and much more…

Note: Once all your Setup information is done, you do not have to do this again at next start-up: all Setup information is saved in the PC Registry, via the Save button or Exit button in Main (answer Yes).

By default, the program assumes you want to connect via a RS232 connection. That's why the Connect via: option for RS232 is true. Also note that the TCP/IP menu (in the top of the window) is disabled, as are the Proj IP address and the Proj TCP port text boxes entries.
Via the Combo-boxes you can now select over which Comm port in your laptop or PC you want to communicate with the projector. The combo-box will show all comm. ports available on your Windows PC. Via the BaudRate, Parity, Databits and Stopbits combo-boxes you can

adapt to projector requirements. In projector documentation this would appear something like this: ‘115200,N.8,1’.
Most projectors I know of do not use ‘handshaking’ (sometimes also called ‘flagging’), but with the Handshaking combo-box you can select hardware or software flagging, or both, or just simply None.

Note: Most projector manufacturers only use the transmit, receive and signal earth pins in their connectors, without handshaking.

If you want to communicate over TCP/IP, then select the TCP/IP option.

Now that you selected the TCP/IP option, the RS232 combo-boxes, just as the RS232 menu selection in the top, are disabled. In the Proj IP address and Proj TCP port you can now enter the values to reach the projector over a LAN or WLAN connection.

Note: The Trail chars combo-box is still enabled. If the projector communication protocol requires a Cr, Lf or combined CrLf, you can select it here.

Setup, command strings.

In the bottom part of the Setup window, you will need to specify projector commands strings. Whether you want to communicate over RS232 or TCP/IP, the specified command strings will be send out via the buttons in the Control window.
Defining the commands is possible in 4 ways:

- Enter ASCII only (from the keyboard) if the projector accepts that. For example '(PWR1)' to power on an InFocus CLI coherent protocol projector.
- Enter Hex only (from the keyboard) if the projector documentation describes that. In that case enter each Hex value as \xYZ, with YZ being the Hex representative. For example, \x28 represents ASCII '(', \x02 as STX, \x03 as ETX or \x0D as Cr. For example, '\x02\x50\x4F\x46\x03' may power on a Panasonic projector.
- Enter a mix of ASCII and Hex. For example, an entry like '\x28PWR?\x29' will request power status of an InFocus CLI coherent protocol projector.
- Hit the Projectors (top menu right) entry in the Setup window form. This will allow you to select from a range of pre-defined command strings (and communication settings), read-in from a file called projectorsdef.txt (standard supplied). More about that later in this manual.

Note: Whatever method you use to enter the projector command codes, via Save or Main/Exit, they will be saved to PC registry exactly as you specified, and after program restart will appear the same again in the text fields.

Note: The same applies to the Direct line interface Window. In the Send text field, you can use any of the methods above. More about the Direct line interface Window later is this manual.

If all communication parameters are set, and if all command strings are defined, you may want to go to the Control Window.

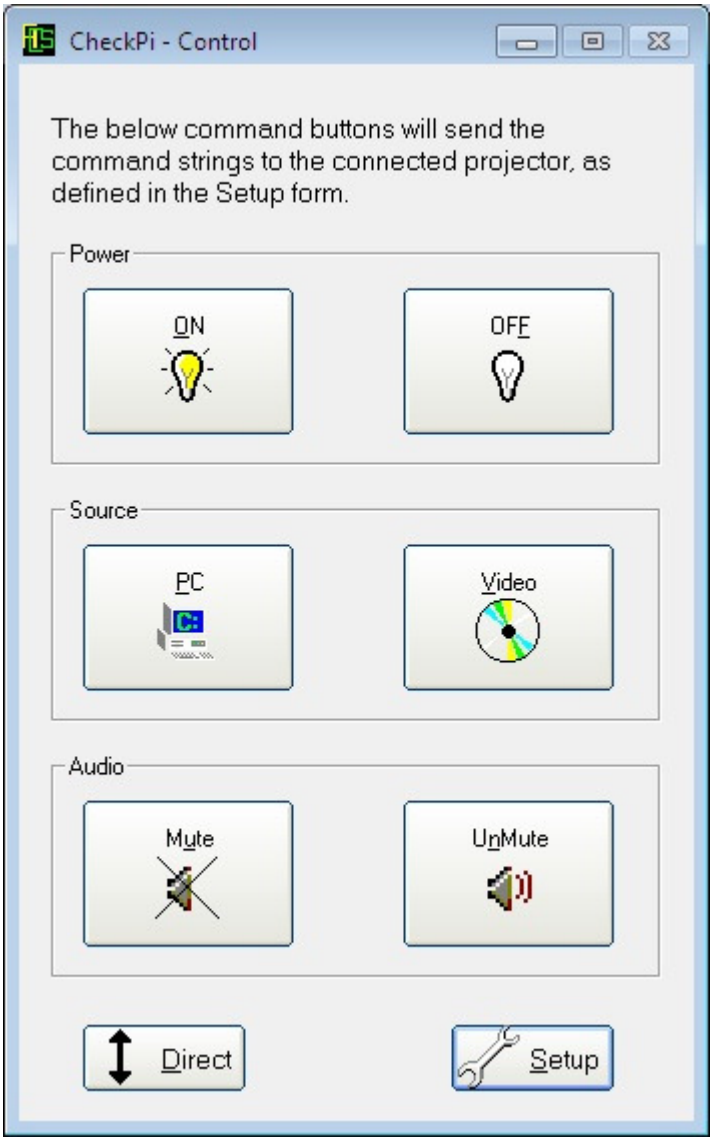
Hitting the Control button will:

- Establish all communication settings, whether for RS232 or TCP/IP.
- Establish all command strings to be used.
- Try to connect either via the specified Comm port, and it's parameters (Baudrate, Parity, Databits, Stopbits) and Handshaking, or try to connect via TCP/IP via parameters provided (IP address and projector TCP port), depending on option chosen.

Note: In connecting via TCP/IP, by default the program is using a PC local port number 0. This will automatically search for a free PC TCP port . How to change this (e.g. to bypass a Firewall), is later discussed in this manual.

Note: If a connection was already established, this will be reported in the Direct line interface window. In that case, a new connection will not be made until you Close a previous connection. More about this subject later in this manual.

The Control window.

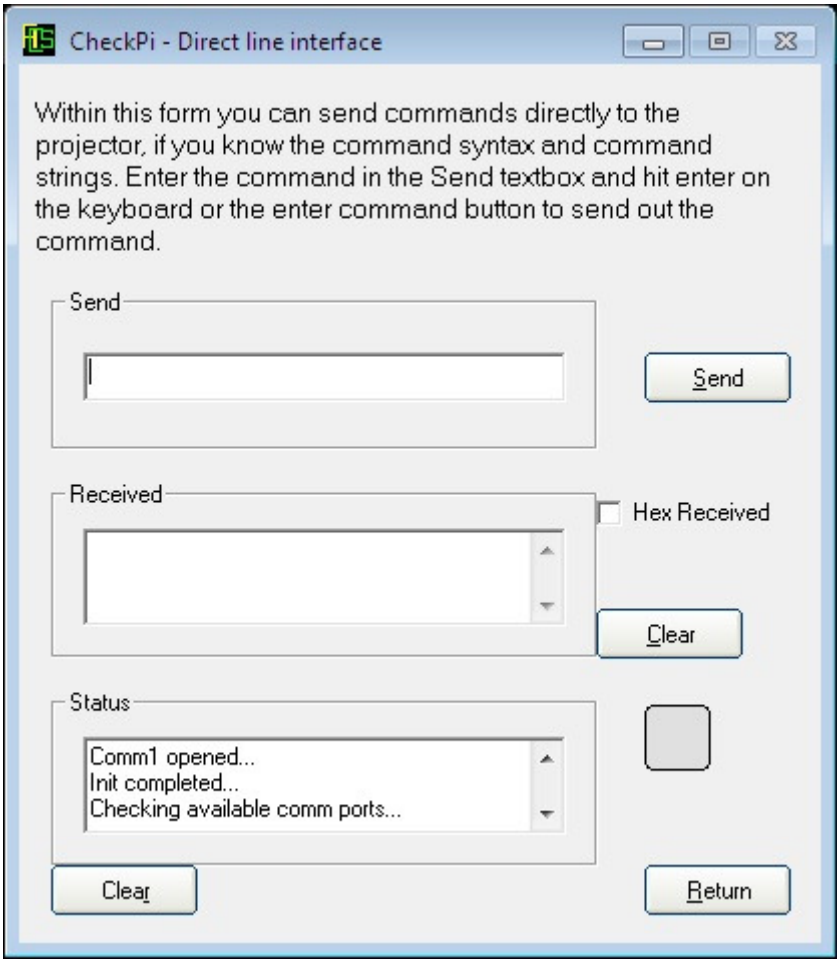


Once you get into the Control window, a communication link should be established, and the buttons are programmed to send out the projector command strings.
Hitting one of the 6 buttons will send out the pre-programmed command to the projector.

Note: If a connection can NOT be made, you will receive an error message such as the one below. Later in this manual we will discuss possible causes and solutions to fix it.

Next to the 6 pre-programmed buttons, there is a VERY important button labeled ‘Direct’.

The Direct button will bring up the Direct line interface window:


CheckPi - Direct line interface
Within this form you can send commands directly to the projector, if you know the command syntax and command strings. Enter the command in the Send textbox and hit enter on the keyboard or the enter command button to send out the command.
Send
Send
Received
Hex Received
Clear
Status
Comm1 opened...
Init completed...
Checking available comm ports...
Clear
Return

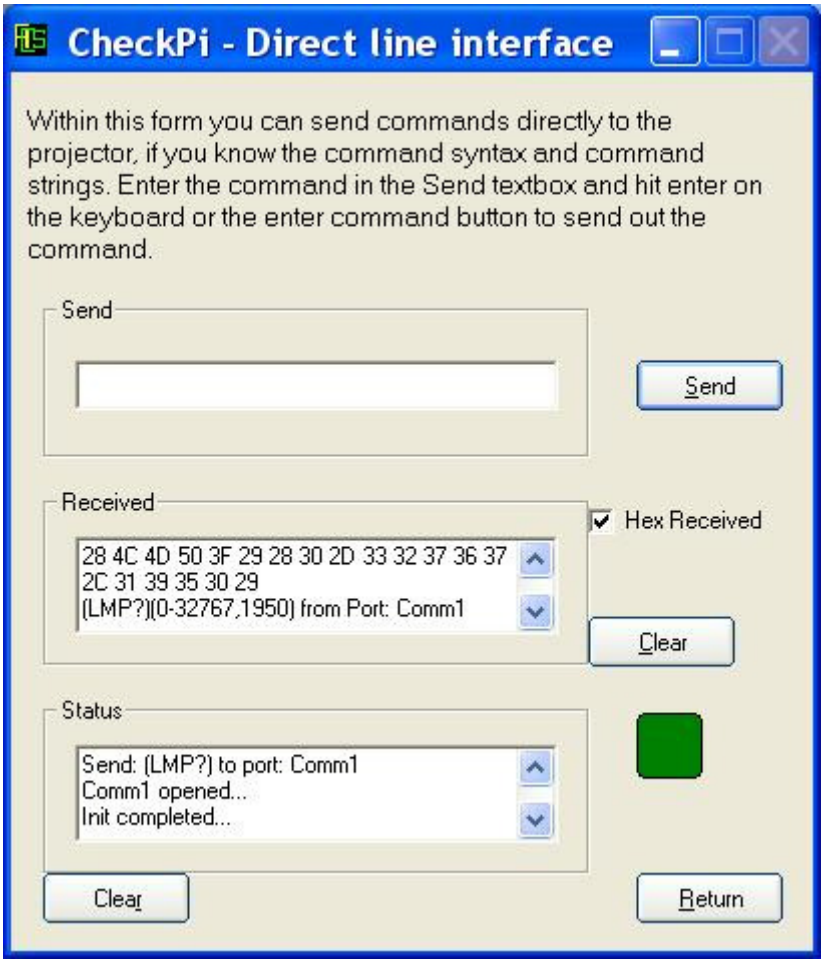
In the Status frame (below in the form), you can verify what has happened. Any action you take and any command you sent will be registered here, so that you can verify.
If you have send a command via 1 of the 6 control window buttons, the Status frame will show what was sent.
The Received frame will record what was received back from the projector. Combining the Status frame (what was sent) and the Received frame, you can always monitor how the projector is responding to a command being send, and the response being received.

In the Send frame textbox, you can enter any other command (not defined under any button), directly. Enter ASCII only, Hex only or a combination, such as earlier described under **Setup, command strings.** After you entered the command, either hit the Enter button on the keyboard or hit the Send button (or Alt + S).

Next to the Received frame, you can check ‘Hex received’. Normally (and when not checked), the program will display the reply in ASCII. Checking ‘Hex Received’ will first display the ASCII response followed by a translated Hex response. See example on next page.

The Clear buttons will clear the text fields, so that you can concentrate on what is being sent and received back.
Note: When the text-boxes contain more then 65000 characters, they will be automatically cleared.

Here's an example of how it may look like after sending a lamp request command from an old laptop (XP-based) computer:

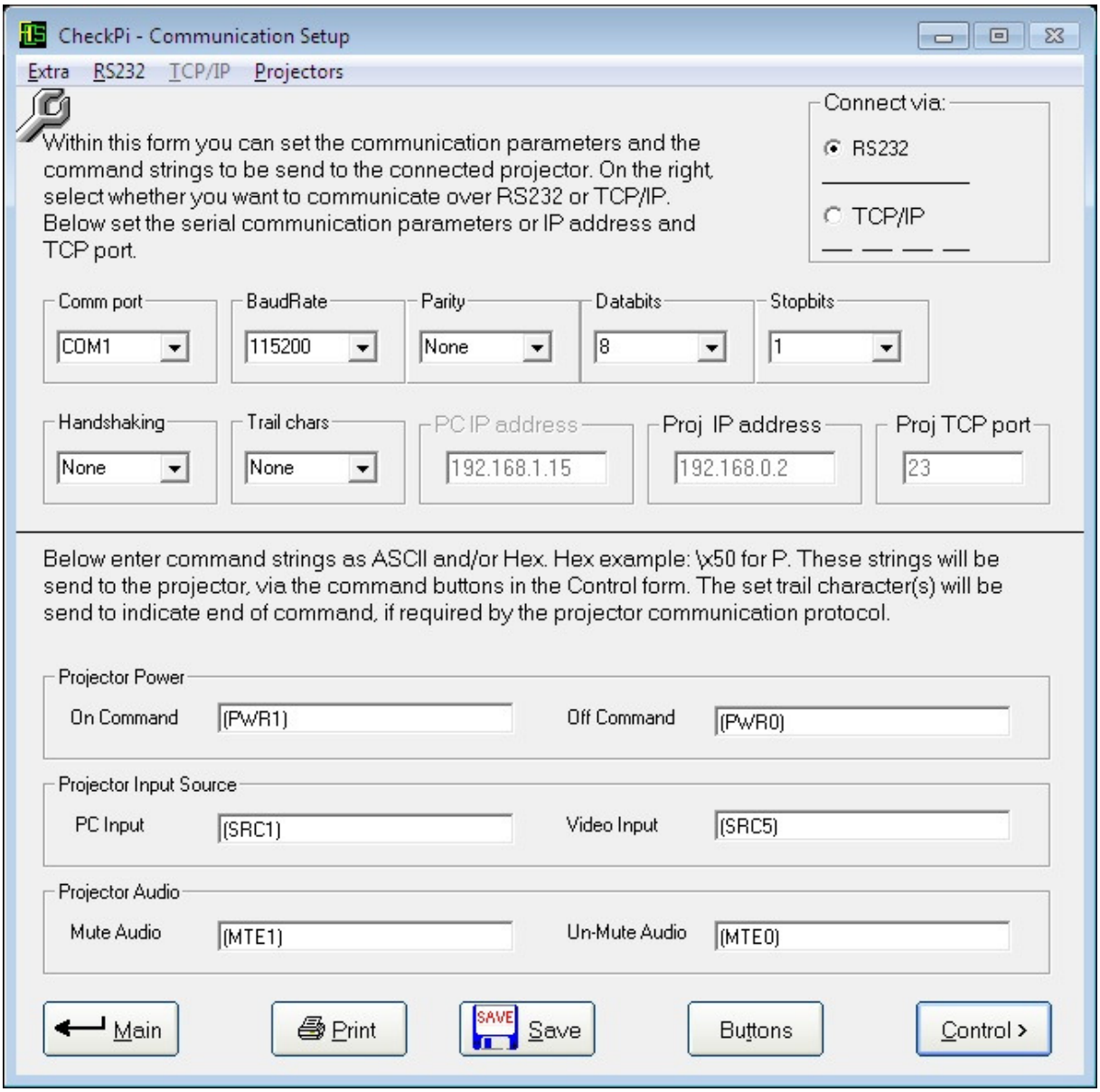

CheckPi - Direct line interface
Within this form you can send commands directly to the projector, if you know the command syntax and command strings. Enter the command in the Send textbox and hit enter on the keyboard or the enter command button to send out the command.
Send
Send
Received
Hex Received
28 4C 4D 50 3F 29 28 30 2D 33 32 37 36 37
2C 31 39 35 30 29
(LMP?)(0-32767,1950) from Port: Comm1
Clear
Status
Send: (LMP?) to port: Comm1
Comm1 opened...
Init completed...
Clear
Return

In the Status frame you can see that the command sent was '(LMP?)'.
In the Received frame (3rd line) you can see how the projector responded back: '(LMP?)(0-32676,1950)' which in this case means, 1950 lamp hours.
Note: CheckPi is not interpreting projector feedback. If an A/V controller programmer wants to add that to his or her program, this is up to him or her.
In the first 2 lines, the response has been translated to Hex values, with a space between each of the bytes. So in this case, both ASCII and Hex translated response is shown.

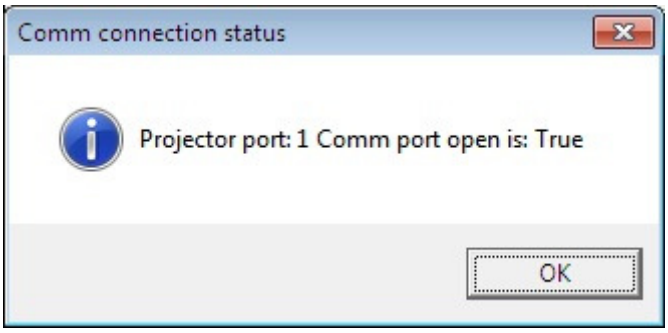
Next (Right) to the Status frame is, what we call, the communicator indicator.
In this case, the communication indicator is colored Dark Green.
If you send out a command to a connected projector, the communication indicator will be Light Green. If a response is received back, it will color Dark Green. This is, in the Direct line interface window, a simple indicator to show you connections and responses are okay.

Note: You can bring up the direct line interface next to the Control window, for monitoring.

How else can you tell the connection is okay?
Hitting the Return button in the Direct line interface form or Setup in the Control window form, will you bring back into Setup:



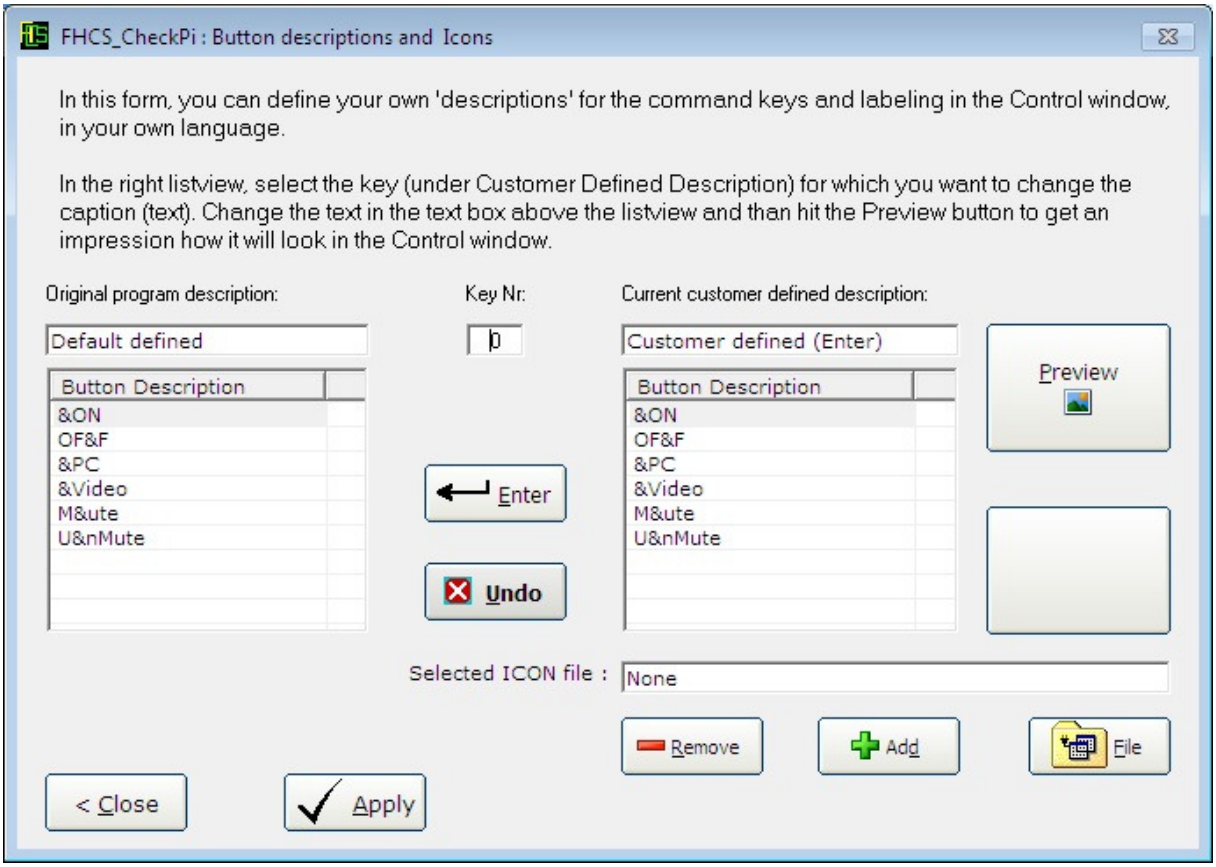
Note in the top/right corner, the option RS232 is true, and the dashed line underneath it has changed to a solid line, indicating a successful connection has been established.
Also note that the TCP/IP menu (top of window) is disabled.
Under RS232 (menu, top of window), hit State:



All of this indicates you have a good connection.

Adapting the GUI (graphical User Interface).

So far, this user manual, the whole program and all program text is written in the English language. Most A/V professionals do not have any problem with that. But may be, they want to adapt this program, to their own liking. With FHCS_CheckPi that is possible.
Hit the Buttons button in the Setup window:


FHCS_CheckPi : Button descriptions and Icons
In this form, you can define your own 'descriptions' for the command keys and labeling in the Control window, in your own language.
In the right listview, select the key (under Customer Defined Description) for which you want to change the caption (text). Change the text in the text box above the listview and than hit the Preview button to get an impression how it will look in the Control window.
Original program description:
Key Nr:
Current customer defined description:
Default defined
0
Customer defined (Enter)
Button Description
&ON
OF&F
&PC
&Video
M&ute
U&nMute
Enter
Undo
Preview
Selected ICON file :
None
Remove
Add
File
< Close
Apply

In the left ListView you will see the Default defined button labeling. The right ListView shows your own modifications. In this case, no modifications were (yet) made.

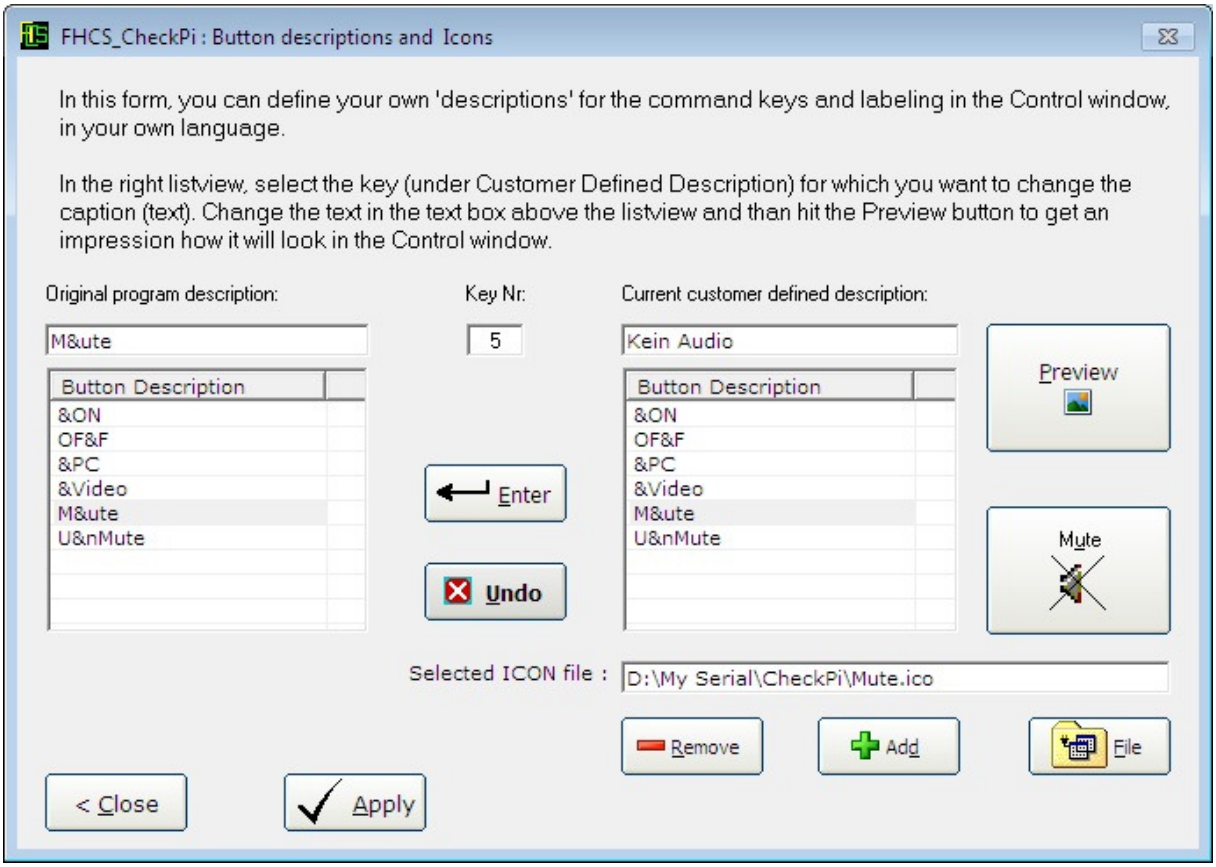
Note: An '&' in front of a character allows a keyboard input like 'Alt+O'. In this example it will execute code under the &ON button.

What is the main purpose of this form ?
Within this form you can:

- Define your own (text) labeling to the button in the control window, in your own language (examples will follow). This way we can support multi-lingual environments.
- Select icons (or pictograms) to be added to the command buttons (or remove them again).
- Select photo's or other graphics to be added to your buttons (or remove them again).
- Preview labeling (text) and/or graphics.
- Undo text changes (back to default) or remove graphics.

Note: No button was selected (yet) in the right ListView. You can also tell by the Key Nr. Which in this case is 0.

In the next screenshot we selected the Mute button:


FHCS_CheckPi : Button descriptions and Icons
In this form, you can define your own 'descriptions' for the command keys and labeling in the Control window, in your own language.
In the right listview, select the key (under Customer Defined Description) for which you want to change the caption (text). Change the text in the text box above the listview and than hit the Preview button to get an impression how it will look in the Control window.
Original program description:
Key Nr:
Current customer defined description:
M&ute
5
Kein Audio
Button Description
&ON
OF&F
&PC
&Video
M&ute
U&nMute
Enter
Undo
Preview
Mute
Selected ICON file :
D:\My Serial\CheckPi\Mute.ico
Remove
Add
File
< Close
Apply

After we selected the 'M&ute' button in the right ListView, and under the Preview button, the button will show the labeling and the selected (in this case) icon or pictogram. This represents the current setup.
In the left ListView you will see the default original labeling text. These defaults will never change.
Under the 'Current customer defined description:' label, you can enter the text you want on your command button. In this case we have entered "Kein Audio" but we did not yet confirm this (via an Enter from the keyboard or hitting the Enter button in the window).
Via the preview button and the show button underneath it you can see it still displays 'Mute'.

Either hit the Enter key on your keyboard or the Enter button in the window form, to change your text accordingly.

After this, the right ListView text has changed to 'Kein Audio' and the show button has too.
The left ListView description has not changed (still displays 'M&ute').
At this point, either hit the Apply button or the Undo button.
Undo will restore the original text labeling (in this case 'M&ute').
Apply will bind the new text ('Kein Audio') to the button, but will not close the window so that you can make other text labeling changes.

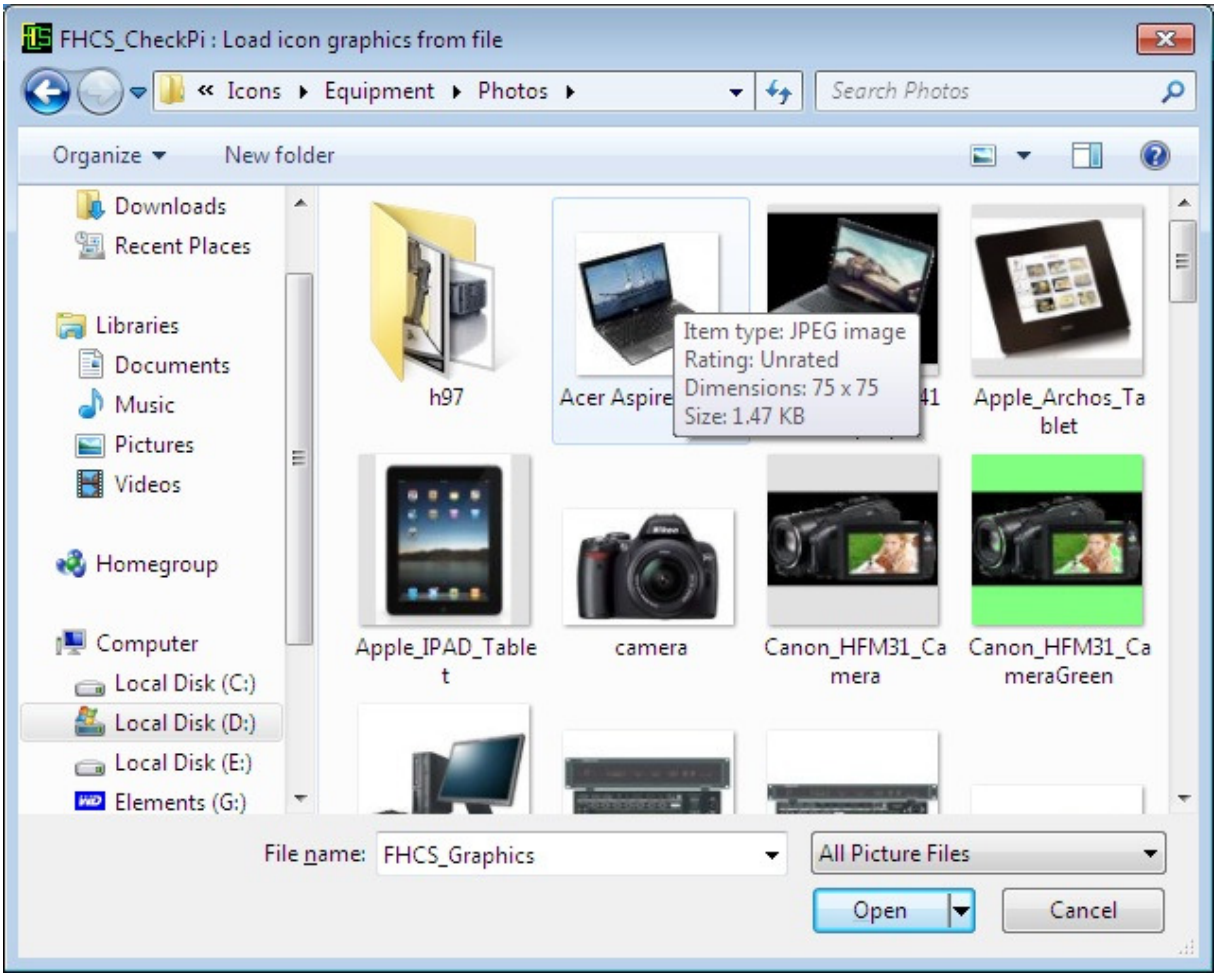
Note: In this case the key nr is 5. FHCS_CheckPi is counting key numbers and labeling from left to right, with the &On key as 1.

Note: Apply will not change modifications made to the associated icon or graphics file. This is done by a Add and Apply combination.

Note: Some pre-defined icon (pictogram) files are supplied with FHCS_CheckPi for free. These can be found in the program folder where you installed FHCS_CheckPi. You can make your own icon files or graphic files yourself with icon-editors or obtain them (e.g. jpg or photo's) from the Internet.

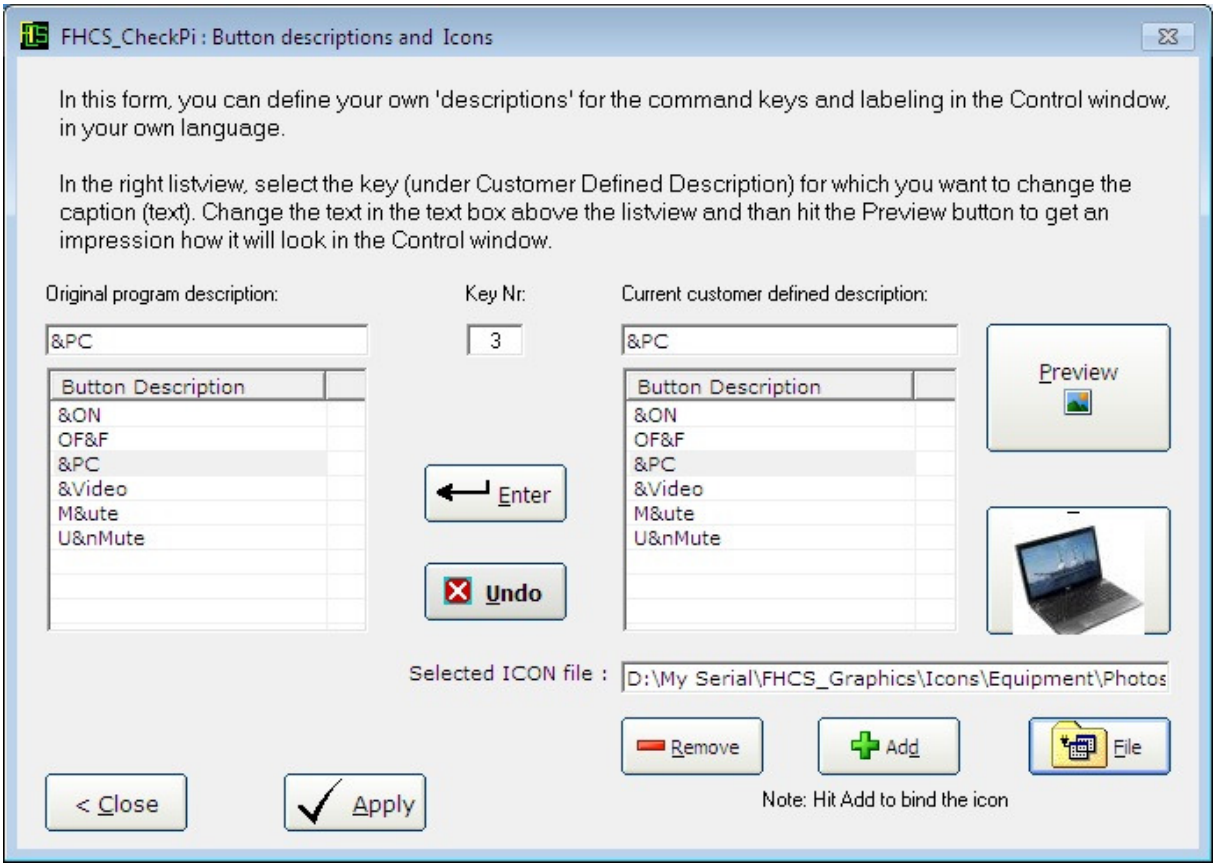
Next to changing text associated with a command button or label, you can also change graphics associated with a button.

In the next example, we selected the PC button, to add graphics associated with it.
Hit the File button to select a graphics file for the PC button:



A Dialog will appear. Browse to your folder and select the graphics you want.
Double click the file or the Open button to add graphics or icon to your button.

As an example, we selected an image obtained via Internet:



If you are content with your selection, hit the Add button. This will bind your selection and make it appear it the control window.
If not content, hit the remove button. You can then select another image or do without.

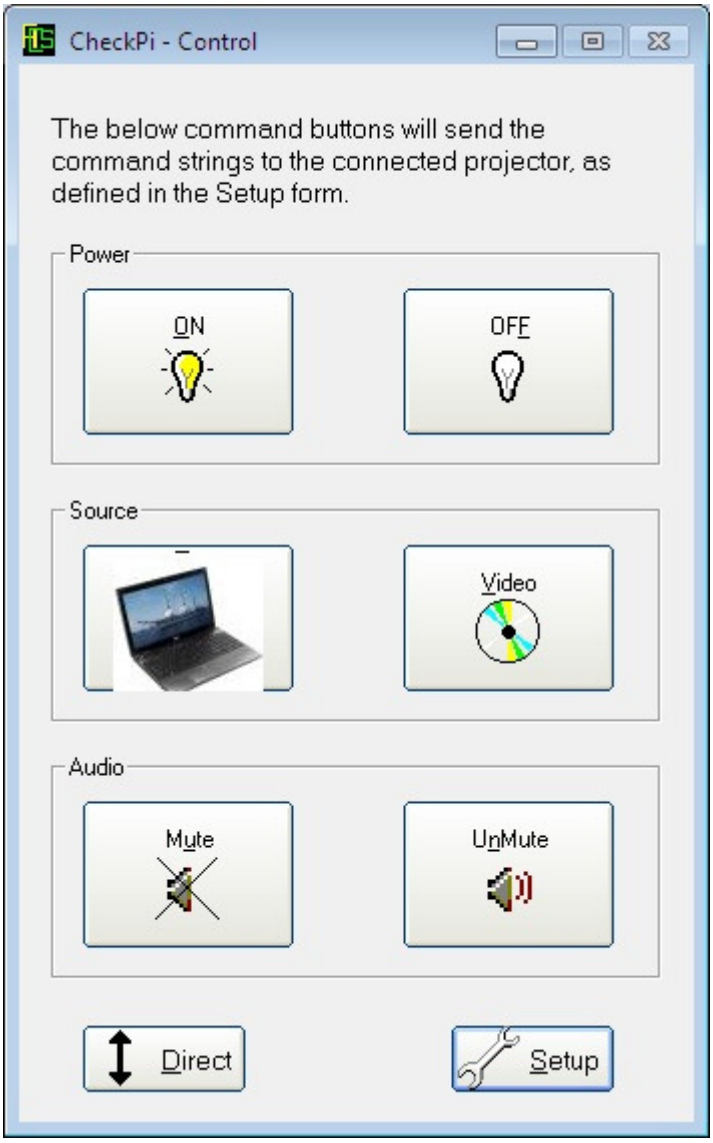
Note: As stated before, make sure to hit the Apply button for text changes to go into effect, hit the Add button for graphic images to go into effect.

Hit the Close button to go back to the Setup Window.

If, at this point, you want to go to the Control window, without making any other changes, the control window will appear as follows:

*Note: Because the graphic file added to the 'PC' Button is larger than a 16*16 or 32*32 icon file, the text labeling is not seen.*

Note: Some Backgrounds and Icons (images, photo's, etc) are included with the software. Frits Handgraaf CS over time has collected these via Internet access. As an end-user you may do the same. On request, FHCS can provide the current collection.
Note: Images nor button icons may fit. You may have to scale them accordingly.
Note: PNG files can not be loaded with this software. You may want to translate these images into bmp, jpeg or other compatible sources.



In the image, the ‘PC’ button now has an image associated. The ‘PC’ labeling text is behind the graphic image (because the image itself is bigger than 16*16 or 32*32 pixels).

Whether you want to change the text labeling or add graphics, it’s all possible via the ‘Buttons’ form.

What else can be adapted and set in the Setup form is discussed in the next chapter.

Setup, additional settings and functions.
In the top of the Setup form you have access to menu's which provide means of further setting up your system environment.

Extra.

- CommandDelay is the delay between sending commands. A message box will pop-up allowing setting command delay in milliseconds. Setting command delay prevents that the projector is receiving a second command while still processing the first.
- ReadDelay is the delay before reading a full reply from the projector. ReadDelay makes sure enough time has passed before reading the entire input buffer, after the number of bytes, specified in RTreshold, are received.
- RTreshold allows to specify a minimum number of bytes (characters) to be received before triggering the read input buffer routines. Default is 6, increase or decrease depending on the length of projector feedback

Depending on your communication speed (baud rate), length and quality of your RS232 cabling, you can use any of these 3 parameters to adapt to the system setup and environment.

- Manufacturer allows to specify a manufacturer name. This name is saved to registry.
- Protocol allows to specify a manufacturer's protocol or model The protocol name is saved to registry.

You can specify any name for manufacturer and protocol. As all communication settings and the command strings are also saved to registry, you basically specify an application setup. If the AV installation uses the same projector in different rooms, you dot have to fill in the communication settings and command strings again. They are read back from registry.
Note: Specifying a manufacturer name or protocol does not load anything, it's only used for savings purposes.
Note: After reading in the projectorsdef.txt file, you can select manufacturer and protocol/model from a listview. This will transfer communication settings and commands into the Setup window, where it can be added if so desired. Manufacturer name and protocol name will then be adapted. See the chapter about the projectorsdef.txt file and the menu description.

RS232.

- State will show the state of the RS232 connection to the projector or other large display.
- Close will close the RS232 connection. Use this if the connection is in error or to select another comm. port.
- Connect can be used to (re-)connect to the projector, e.g. after you changed communication parameters. *Note: When going to the Control window, the program will verify whether a connection was already established. If so, it will leave an established connection intact. If not, it will make a new connection.*
- Comm OpenDelay. Depending on technology used in your Control PC, you can set enough time for a comm. port to open successfully. Increase the timing if the comm. port fails to open (default is 500 milliseconds).

TCP/IP.

- State will show the state of the TCP/IP connection to the projector. This only applies when a projector is connected via TCP/IP, either directly or via a LAN/RS232 adapter.
- Close will close the TCP/IP connection. Use this if the windows socket is in error or keeps trying to connect. When in error, make sure the IP address and TCP port are okay.

- Connect can be used to (re-)connect to the projector, e.g. after you changed IP address, projector TCP port, or PC local port. *Note: When going to the Control window, the program will verify whether a connection was already established. If so, it will leave an established connection intact. If not, it will make a new connection.*
- Local Port. Use this to change the PC TCP port number. This may be required to get through a Firewall. Select to change a local port for reaching the projector. *Note: The default Local Port is 0. This means that the program will use the first free available TCP port to reach the projector. If you rather want to set a fixed port, so that you can change settings in your Firewall and allow sending/receiving via this port, change it here. If you keep it to 0, you may need to disable the Firewall.*

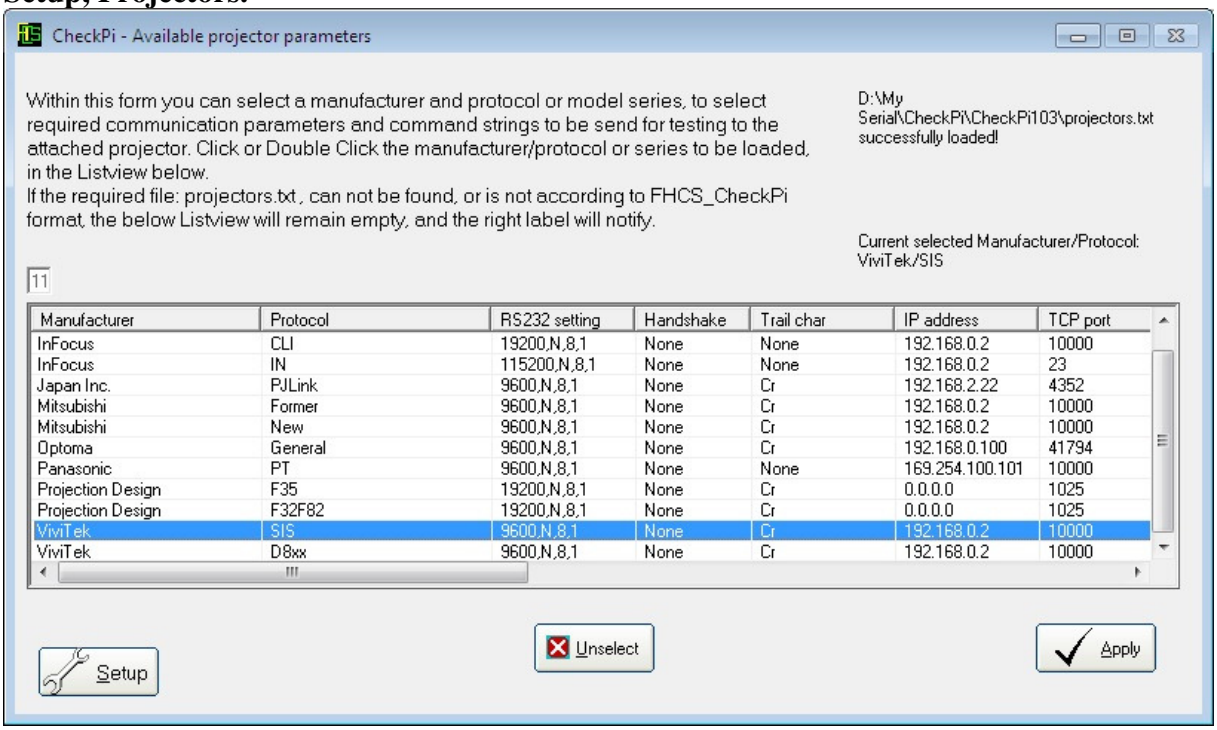
In the bottom of the Setup screen there are buttons we did not discuss (yet):

Save. The Save button will save current communication and command settings to registry. Once saved, they will be automatically (re)loaded after next program (re)start. *Note: Save will save to the HKLM (HKEY_LOCAL_MACHINE\SOFTWARE\FHCS\FHCS_CheckPi\Public) section, so that more users on the same PC can use the program. However, you may need to have administrator rights to save these or even to run this program.*

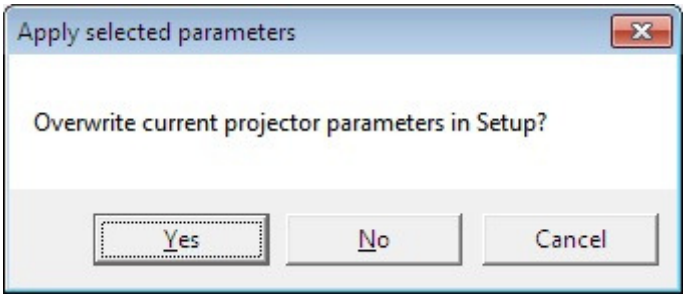
Print. If you want a printed output of all communication settings, hit the Print button. If a 'default' selected printer is connected to your PC, it will print a paper copy. If not, a dialog will appear allowing you to save it as a digital xps document. This file can later be printed via Explorer on another PC with printer attached.

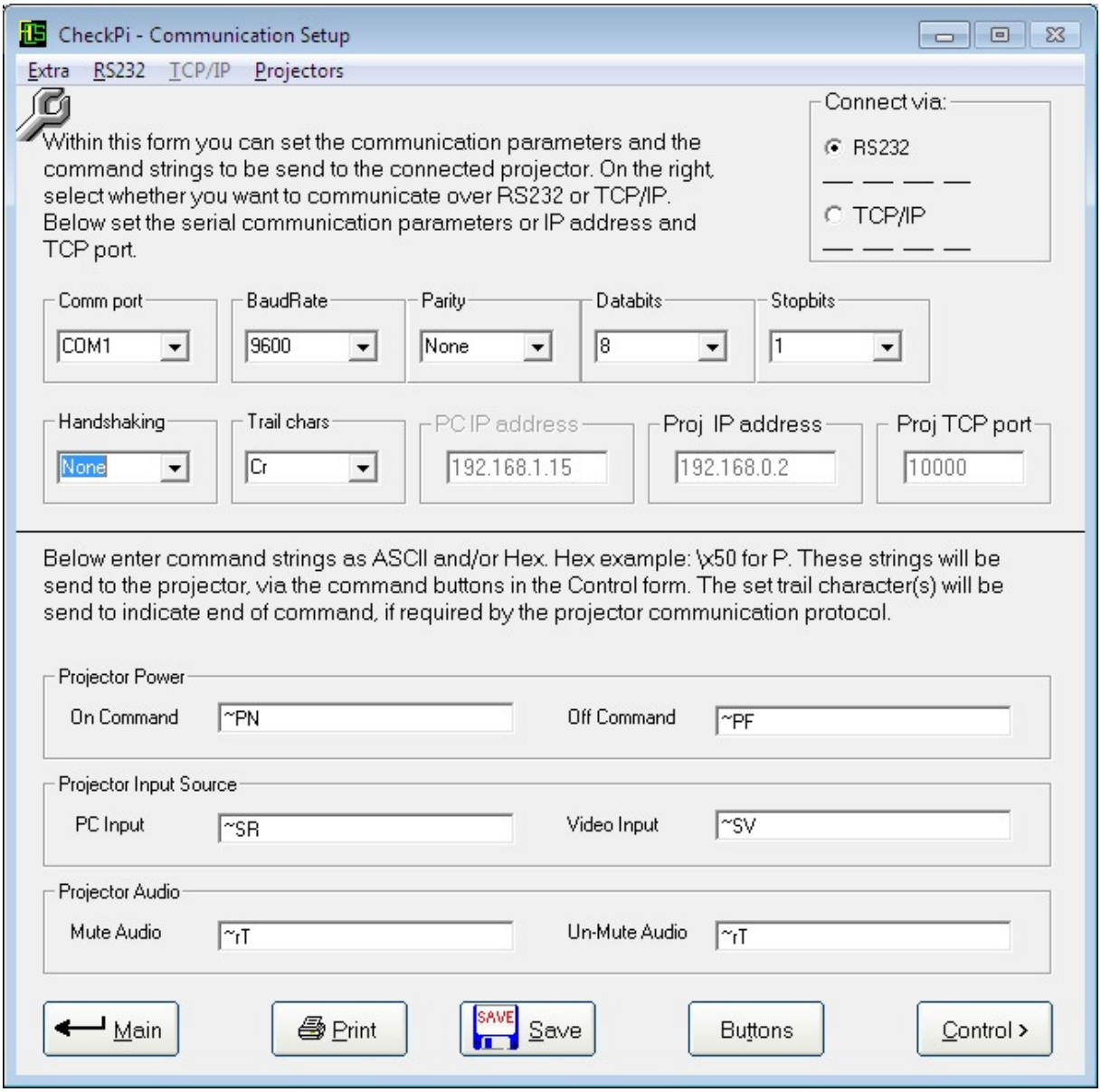
Main. Via the Main button you get back in the startup window. In here you can decide to Exit the program or continue working. When changes were made in the Setup form but not saved, the Exit button will show a dialog still allowing to save your changes made. This is good practice for leaving the program, and closing all forms and connections, so that memory is freed and RS232 or TCP/IP connections can be used by other programs.

Setup, Projectors.


CheckPi - Available projector parameters
Within this form you can select a manufacturer and protocol or model series, to select required communication parameters and command strings to be send for testing to the attached projector. Click or Double Click the manufacturer/protocol or series to be loaded, in the Listview below.
If the required file: projectors.txt, can not be found, or is not according to FHCS_CheckPi format, the below Listview will remain empty, and the right label will notify.
D:\My Serial\CheckPi\CheckPi103\projectors.txt successfully loaded!
Current selected Manufacturer/Protocol: ViviTek/SIS
11
Manufacturer | Protocol | RS232 setting | Handshake | Trail char | IP address | TCP port
InFocus | CLI | 19200,N,8,1 | None | None | 192.168.0.2 | 10000
InFocus | IN | 115200,N,8,1 | None | None | 192.168.0.2 | 23
Japan Inc. | PJLink | 9600,N,8,1 | None | Cr | 192.168.2.22 | 4352
Mitsubishi | Former | 9600,N,8,1 | None | Cr | 192.168.0.2 | 10000
Mitsubishi | New | 9600,N,8,1 | None | Cr | 192.168.0.2 | 10000
Optoma | General | 9600,N,8,1 | None | Cr | 192.168.0.100 | 41794
Panasonic | PT | 9600,N,8,1 | None | None | 169.254.100.101 | 10000
Projection Design | F35 | 19200,N,8,1 | None | Cr | 0.0.0.0 | 1025
Projection Design | F32F82 | 19200,N,8,1 | None | Cr | 0.0.0.0 | 1025
ViviTek | SIS | 9600,N,8,1 | None | Cr | 192.168.0.2 | 10000
ViviTek | D8xx | 9600,N,8,1 | None | Cr | 192.168.0.2 | 10000
Setup
Unselect
Apply

The image on the previous page shows what happens once you hit Projectors in the menu. For the 6 predefined command strings (power on, power off, pc input, video input, mute, unmute) and for predefined communication settings (RS232 and TCP/IP) it will read in a predefined text file (projectorsdef.txt) and place the content in a Listview on a new window form.
Scroll down to see more manufacturers/protocols or scroll right to see the command strings.
In the example you see that Manufacturer Vivitek and Protocol SIS are selected.
After you hit the Apply button and the Yes button in the message, the Setup window will change accordingly:





If you at this point hit the Control button, the program will (try to) make a new connection using the new communication settings.
Note: If a previous connection was made, you want to close that connection first (via RS232 or TCP/IP Close), so that the RS232 or TCP/IP connection parameters can be re-programmed.
Next to the communication settings, the command strings are re-defined and go into effect once a (new) connection is made (either via the Control button or RS232 or TCP/IP Connect).

Note: If you realize you made a wrong selection all together, do not panic! There are 2 ways to come out of this situation:

- ***Leave the program WITHOUT saving current settings, and re-start it. This will read in previous definitions from the registry.***
- ***Go back to the Projectors window and select (and Apply) another entry.***

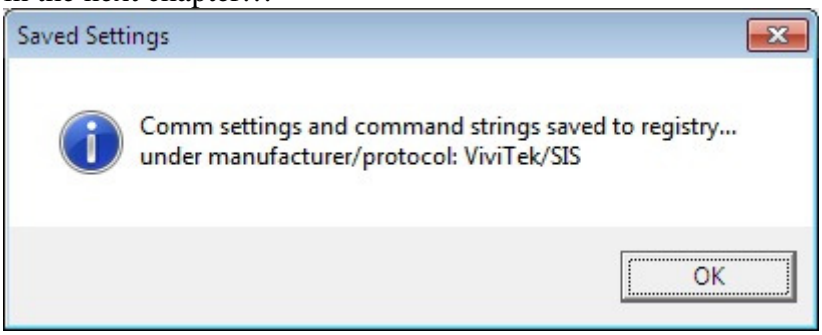
If you did not yet hit the Apply button, hitting the Unselect button will bring you back to start-up status.
The top right label will tell you whether the projectorsdef.txt file was found and successfully loaded (or not). If the Listview remains empty, this is an indication of an un-successful load.

The label beneath it will show the currently selected manufacturer/protocol.
Note: When you select Projectors in the Setup menu, the program will read-in the projectorsdef.txt file and the Apply button will be disabled until you make a selection in the Listview. The label will show the manufacturer/protocol which was read out of the registry at program startup. If you made a selection, the Apply button will be enabled. Hitting the Unselect button will unselect and bring back the original status.
Note: Only after hitting the Apply button, the Setup window will be updated.

Hitting the Setup button will bring you straight back to the Setup window.

As stated before, using the Projectors function is absolutely not required.
In some cases it may prevent to carry extra weight in paper describing communication and command syntax. In other cases, you can amend projectorsdef.txt in the office or before you travel to the installation site, to be prepared.
Surely, next to the pre-programmed communication settings and (6) command strings, you may need other command strings for different functionality. And you can test those via the Direct line interface window, and verify the replies.
CheckPi is aimed to be a projector/large display interface checking utility. The combination of Projectors and the projectorsdef.txt file is a tool to assist in that aim.

More about projector communication settings and command syntax (for just a few suppliers) in the next chapter…



Projector commands.
Note: This chapter does not intent or claims to provide exact matching guidance for Projector manufacturers and/or their models, or to be precise and totally correct. Depending on models, the command syntax can be totally different. Depending on models, the serial (RS232) or LAN (TCP/IP) commands and syntax can be totally different too. This paragraph is solely presented to give some hints. If you do want to control a projector via this program, refer to manufacturer documentation to get it right.

In Setup, you can program the commands to Power On/Power Off projectors, switch PC or Video input, or to Mute/Unmute audio. In the Direct Line interface you can test other projector commands.

Some manufacturers and their models allow to enter ASCII only commands, some allow to enter Hex only commands, others allow a mix of Hex and ASCII. FHCS_CheckPi (Setup and Direct Line) allows to enter a mix. It can differentiate a Hex byte versus an ASCII byte via a \xwz input (wz is the Hex number representative).

InFocus CLI (Command Line Interface).
Serial communication setting: 9600,N,8,1. Handshaking(flagging): None. Trail: None
InFocus projectors adhering to the 'CLI' protocol will accept ASCII commands. For instance, powering up the projector can be accomplished by entering '(PWR1)' without the ' quotes.
In this program you can also enter '\x28PWR1\x29' to accomplish the same effect, which is powering on the projector, whether via RS232 or TCP/IP.
Or alternatively, enter '\x28\x50\x57\x52\x29' (all Hex).
'(PWR0)' is powering Off.
Other commands (depending on model source and build-in speakers):
'(SRC0)' PC
'(SRC1)' Video
'(MTE1)' Mute enabled on
'(MTE0)' Mute enabled off
Most legacy InFocus projectors do not have a TCP/IP (RJ45) interface but can be addressed via a network adapter such as the Lantronix UDS-10 or UDS1100. In that case the TCP port is 10000.

InFocus IN.
The settings and commands described here are specific for the IN3916, but may apply to other IN series models too.
The major difference is in the communication setting: 115200,N,8,1. Next to that, the protocol has the same syntax as the CLI protocol, but source select may be different. Handshaking: None. Trail: None.
You can address the InFocus IN3916 via Telnet, and as such set TCP port to 23. Adapt the IP address to the environment.
Commands:
'(PWR1)' Power On
'(PWR0)' Power Off
'(SRC1)' VGA 1
'(SRC5)' Composite video
'(MTE1)' Mute enable
'(MTE0)' Mute disable

Panasonic PT.
Serial communication setting: 9600,N,8,1. Handshaking(flagging): None. Trail: None
Most Panasonic projectors (models PT) require a syntax such as STX 3Command bytes : Parameters and ETX. A power on example is like this: '\x02PON\x03', which is a mixture of Hex and ASCII. You can also enter an all Hex format.
Note: As Hex values below 32 can not be presented in ASCII, the Debug window may show '|PON|' , or other characters, as sent out.
You can also enter a power off command (for example), in full Hex: '\x02\x50\x4F\x46\x03'.
Note: Panasonic projectors may have an identifier. Syntax would then be:
STX AD I1I2 ; C1C2C3 : P1P2Pn ETX
AD I1I2 ; designates the ID where AD can be ZZ (for All), I1 and I2 1-64 and 0A-0Z
Examples: ADZZ for 'All', AD01 for ID1, AD0Z for group Z.
In that case a power On would look something like this:
'\x02ADZZ;PON\x03' or '\x0200;PON\x03'
Note: As we did not have a Panasonic available for testing, we are not 100% sure.
Other commands:
'\x02IIS:RG1\x03' Input device is RGB1
'\x02IIS:VID\x03' Input device is Video
'\x02AVL:000\x03' Audio volume level is 0 (there is no Mute command)
\x02AVL:032\x03' Audio volume level is 32
Some Panasonic projectors may have a RJ45 connector, but we are not sure from the documentation which TCP port to address.

Epson ESC/VP21.
Serial communication setting: 9600,N,8,1. Handshaking(flagging): None. Trail: Cr
EMP projectors from Epson, adhering to the ESC/VP21 protocol, have a syntax like
: command + Cr
In this case we call the Cr a 'trailing character'.
Now there are different options.
You can enter ':PWR ON' in ASCII, while specifying in Setup, trail character to be 'Cr'.
Or you can enter ':PWR ON\x0D', with in Setup, trail character to be 'None'.
Via TCP/IP the projector TCP port to address is: 3629
Send: 'ESC/VP.net\x10\x03'. This will invoke the Epson TCP/IP interpreter. After the command is sent the reply would read something like this: 'ESC/VP.netESC/VP.net:'
Note: we have not been able to test the above TCP/IP connection description.
Other commands:
':PWR OFF'
':SOURCE 00' Source 0, RGB/VGA?
':SOURCE 01' Source 1, Video
':MUTE ON'
':MUTE OFF'

ViviTek SIS (Serial Interface Specification).
Serial communication setting: 9600,N,8,1. Handshaking(flagging): None. Trail: Cr
ViviTek projectors applying to the SIS protocol will accept ASCII commands. Command structure: ~AB + Cr. Set trail character to Cr or end the command with a \x0D (trail character is None). Power ON: ~PN, power off: ~PF.
Other commands:
'~SR' Source RGB

‘~SV’ Source video
‘~rT’ Mute/Unmute
A network adapter such as Lantronix UDS1100 can be used for TCP/IP connection.

ViviTek D8xx.
Many projector suppliers may also OEM from other manufacturers. The D8xx series have another protocol.
Serial communication setting: 9600,N,8,1. Handshaking(flagging): None. Trail: Cr
Command structure: V ID Type Group X1X2 P, where V is the header, ID is a 2 byte projector identifier (00-98, 99 is All), T is command type (S or G), Group is a 2 byte command group indicator (00 – 04), X1 and X2 indicate the command, and P are parameters.
Power On: ‘V99S0001+Cr’ .Set trail character to Cr or send ‘V99S0001\x0D’ (with trail is None). Power Off: ‘V99S0002’ (trail character set to Cr).
If you do not want to address all projectors, change the ID accordingly.
Other commands:
‘V99S0201’ RGB
‘V99S0204’ Video
‘V99S0413’ Mute/Unmute

Japan Inc. PJLink.
In 2005 most Japanese projector manufacturers decided to adhere to 1 specific protocol definition for networked (TCP/IP) communication. They called it Projector Link (PJLink). Obviously the IP address is not standard but the TCP port to address was set to 4352. Trail: Cr
Note: The projectorsdef.txt file accompanying FHCS_CheckPi, contains the entries for all so far listed projectors. For coherence, in this file, communication setting for RS232 are set to 9600,N,8,1 with Handshaking set to None.
Commands:
‘%1POWR 1’ Power On
‘%1POWR 0’ Power Off
‘%1INPT 11’ Input RGB1
‘%1INPT 21’ Input Video1
‘%1AVMT 31’ A/V mute On
‘%1AVMT 30’ A/V mute Off
Note: ‘%’ is the header character. The ‘1’ in the example above is indicating the ‘class’. Change accordingly if required.

Mitsubishi Former.
Serial communication setting: 9600,N,8,1. Handshaking(flagging): None. Trail: Cr
Command structure: 00 function data + Cr, where ‘00’ is the header, the function byte indicates the function and the data byte the parameter. Set trail character to Cr, or to None (and add \x0D).
Commands:
’00!’ Power On ‘\x30\x30\x21’
‘00”’ Power Off ‘\x30\x30\x22’
‘00_r1’ Input RGB1
‘00_v1’ Input video
‘00ra6’ A/V Mute/Unmute

Mitsubishi New.
Serial communication setting: 9600,N,8,1. Handshaking(flagging): None. Trail: Cr

Command structure: 00 ;ID; function data :N + Cr, with ID being projector identifier (00 – 63) or group identifier (0A – 0Z).
Commands:
’00;01;!:N’ Power On
’00;01;”:N’ Power Off
’00;01;_r1:N’ Input RGB1
’00;01;_v1:N’ Input Video
’00;01;ra6:N’ A/V Mute/Unmute ?

Projection Design F35.
Serial communication setting: 19200,N,8,1. Handshaking None. Trail: Cr.
Command structure:
1 byte header, separator, 1-3 bytes address, separator, message body, terminator. The space separators are optional, terminator is Cr, header is ‘:’
Commands:
‘:POWR1’ Power On
‘:POWR0’ Power Off
‘:IDVI1’ Input DVI1
‘:IHDM1’ Input HDMI1
‘:MENU’ Toggle OSD menu on/off (F35 has no audio commands).
The F35 has a default IP address of 0.0.0.0 meaning that it expects an IP address to be assigned by a DHCP server. TCP port is 1025.

Projection Design F32F82.
Serial communication setting: 19200,N,8,1. Handshaking None. Trail: Cr.
Baudrate can also be set to 4800 or 9600.
Command structure:
1 byte header, separator, 1-3 bytes address, separator, message body, terminator. The space separators are optional, terminator is Cr, header is ‘:’
Commands:
‘:POWR1’ Power On
‘:POWR0’ Power Off
‘:IVGA’ Input VGA
‘:ICVI’ Input composite video
‘:MENU’ Toggle OSD menu on/off (F35 has no audio commands).
The F35 has a default IP address of 0.0.0.0 meaning that it expects an IP address to be assigned by a DHCP server. TCP port is 1025.
Note: There is little difference between F35 on one hand and both F32 and F82 series, except for input connectors.

Optoma General.
Serial communication settings: 9600,N,8,1. Handshaking: None. Trail: Cr.
Wit trail set to None, add \x0D to command string.
Commands:
‘~XX00 1’ Power On
‘~XX00 0’ Power Off
‘~XX12 5’ Input VGA1
‘~XX12 10’ Input video (composite)
‘~XX03 1’ Mute
‘~XX03 0’ Unmute

Note: According to the user manual for the TH7500-NL, you can set an IP address and TCP port for a Crestron controller (via web browser such as Explorer). In principle, you can also use that for this program. The manual suggest 192.168.0.100 as example with TCP port being 41794.

Eiki LC-series Basic.
Serial communication settings: 19200,N,8,1. Handshaking: None. Trail: Cr.
With trail set to None, add \x0D to command string.
Commands:
'C00' Power On
'C01' Power Off
'C05' Input1
'C06' Input2
'C0B' Mute
'C0C' Unmute

Other projectors.
See their user manuals!
In principle you can use the PJLink protocol to address Japanese produced projectors over a network connection.
If you have any input about other projector protocols, let us know.

Recap.
As you can tell from the descriptions above, most projectors use Cr (\x0D) as terminating character. In this program, set Trail to Cr, and you can type and send the ASCII command strings as listed. If trail is set to None, make sure you add: \x0D to the strings.
Alternatively, you can write all strings in Hex, provided \x is preceding each byte.
See: **Setup, command strings.**, earlier in this manual.

Projectorsdef.txt
As stated before, we can not list any possible manufacturer and model, and associated commands. And we did not study specifically or purposely only the user guides and protocols of afore mentioned manufacturers. Sure, there are many more manufacturers and models that we can list or describe in this user manual, but we want to keep it short in length.
But you, as a user of FHCS_CheckPi, may be do not want to carry all model specific commands and protocol manuals either. Or carry this manual with you all the time.
As a simple but powerful solution, a file called 'projectorsdef.txt' is distributed as part of the complete package. This file embeds the same communication setup and string commands as listed and described in this document. This file is placed in the program folder.
The file is named simply: projectorsdef.txt.
And this file can be read into FHCS_CheckPi (via Setup top menu Projectors).

Can you adapt, change, modify or add manufacturer protocol description or model definitions yourself ? Yes, off course. With a simple text editor such as Notepad you can. Just make sure the projectorsdef.txt file name is not changing, because that is the filename FHCS_CheckPi is looking for in the application path (program) folder.
You will also need to stick to the following format:

Line 1 should read FHCS_CheckPi LITERALLY!
Line 2 should be empty just enter for the next line, this indicates new definition
Line 3 reads manufacturer
Line 4 reads protocol or model
Line 5 reads communications settings e.g. 9600,N,8,1
Line 6 reads handshaking (flagging) e.g. None, Xon/Xoff (software), Hardware (RTS/CTS)
Line 7 reads trail character e.g. None, Cr, Lf, CrLf
Line 8 reads projector IP address e.g. 192.168.0.2
Line 9 reads projector TCP port e.g. 10000
Line 10 reads power on command
Line 11 reads power off command
Line 12 reads PC input command
Line 13 reads Video input command
Line 14 reads Mute command
Line 15 reads Unmute command
Line 16 should be empty end of definition, start of new definition, repeat
Line 17 reads manufacturer
Line 18 reads protocol or model
Etcetera, etc, complete the list with as many entries as you want, not exceeding the text application editor capacity.

Conclusion.
FHCS_CheckPi is a low cost but powerful program to test your projector, large display or other interfaced device, over an RS232 or TCP/IP connection.
It allows to test:

- Commands. Before you start programming an AMX, Crestron, Extron or Creator controller and test via an attached Touch Panel, you want to make sure that the projector is reacting to the commands you send, precisely as you want, and that you can react on the replies received back. You may need to program some timing delays in the controller, depending on system installation environment, projector used, cabling and cabling length. Next to the 6 control window buttons which can be programmed to send out On, Off, PC, Video, Mute, Unmute, you can basically program it (and change caption/labeling and icons) to send out any command. And via the Direct Line interface you can send out any command via a few keystrokes.
- Control cabling. If a connection can not be made via this program, chances are pretty high it can also not be made via the controller. Via FHCS_CheckPi you can experiment, adapt and test until you are very sure your RS232 or TCP/IP cabling connections and required pin-layouts in the cabling, are correct.
- Data cabling. If your A/V controller is to pass on graphics, either from VGA, DVI, HDMI or Display Port sources, you want to make sure the projector or other large display product is representing it correctly. If the A/V controller also embeds scaling or resolution settings, you can emulate that on your PC or laptop.
- Video cabling. If your A/V controller or A/V switcher, is to pass on video signals, either from PC or other sources, via Composite video, S-video, Component video, RGBHS or other, via FHCS_CheckPi you can test the commands required and see the result.
- Audio cabling. Though in actual practice, not many projector speakers are used for audio reproduction, you can test audio cabling anyway. Whether to projector or audio amplification system.

Still using HyperTerminal ? Still using HyperTerminal look-alikes ?

Try using FHCS_CheckPi instead !

Contact FHCS for more information.

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